02/21/02 Rec'd PCT/PTO 19 FEB 2002

FORM PTO-1390 (Modified) (REV 11-2000) U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	U S APPLICATION NO (IF KNOWN, SEE 37 CFR 1 5)
537-1068	10/069422

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/GB00/03238	August 18, 2000	August 19, 1999

TITLE OF INVENTION

Fabrication of Fabry-Perot Polymer Film Sensing Interferometers

APPLICANT(S) FOR DO/EO/US

Timothy Noel Mills, Paul Beard, David Delpy

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U S.C 371
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U S C. 371
3. ☐ This is an express request to begin national examination procedures (35 U.S C 371(f)). The submission must include items (5), (6), (9) and (24) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31)
5. ☒ A copy of the International Application as filed (35 U.S.C 371 (c) (2))
   a. ☐ is attached hereto (required only if not communicated by the International Bureau)
   b. ☒ has been communicated by the International Bureau
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☐ An English language translation of the International Application as filed (35 U S C 371(c)(2))
   a. ☐ is attached hereto
   b. ☐ has been previously submitted under 35 U S C 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U S C 371 (c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau)
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made, however, the time limit for making such amendments has NOT expired
   d. ☒ have not been made and will not be made
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3))
9. ☐ An oath or declaration of the inventor(s) (35 U S C 371 (c)(4))
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5))
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409)
12. ☐ A copy of the International Search Report (PCT/ISA/210)

Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1 97 and 1 98
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3 31 is included
15. ☒ A **FIRST** preliminary amendment
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment
17. ☐ A substitute specification
18. ☐ A change of power of attorney and/or address letter
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter 2 and 35 U S C 1 821 - 1 825.
20. ☐ A second copy of the published international application under 35 U.S.C 154(d)(4)
21. ☐ A second copy of the English language translation of the international application under 35 U S C 154(d)(4)
22. ☐ Certificate of Mailing by Express Mail
23. ☐ Other items or information.

PCTUS1/REV03

U.S. APPLICATION NO (IF KNOWN, SEE 37 CFR 1.5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
10/069422	PCT/GB00/03238	537-1068

24. The following fees are submitted		CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :			
☐ Neither international preliminary examination fee (37 CFR 1 482) nor international search fee (37 CFR 1 445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO	**$1040.00**		
☒ International preliminary examination fee (37 CFR 1 482) not paid to USPTO but International Search Report prepared by the EPO or JPO	**$890.00**		
☐ International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1 445(a)(2)) paid to USPTO	**$740.00**		
☐ International preliminary examination fee (37 CFR 1 482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4)	**$710.00**		
☐ International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4)	**$100.00**		
ENTER APPROPRIATE BASIC FEE AMOUNT =		**$890.00**	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1 492 (e))		**$0.00**	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	9 - 20 =	0	x $18 00	**$0.00**	
Independent claims	2 - 3 =	0	x $84 00	**$0.00**	
Multiple Dependent Claims **(check if applicable)**			☐	**$0.00**	
TOTAL OF ABOVE CALCULATIONS			=	**$890.00**	
☒ Applicant claims small entity status See 37 CFR 1 27) The fees indicated above are reduced by 1/2				**$445.00**	
SUBTOTAL			=	**$445.00**	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1 492 (f)).			+	**$0.00**	
TOTAL NATIONAL FEE			=	**$445.00**	
Fee for recording the enclosed assignment (37 CFR 1.21(h)) The assignment must be accompanied by an appropriate cover sheet (37 CFR 3 28, 3 31) **(check if applicable).**			☐	**$0.00**	
TOTAL FEES ENCLOSED			=	**$445.00**	
				Amount to be: refunded	$
				charged	$

a. ☒ A check in the amount of **$445.00** to cover the above fees is enclosed

b. ☐ Please charge my Deposit Account No _____ in the amount of _____ to cover the above fees
A duplicate copy of this sheet is enclosed

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No **12-0913** A duplicate copy of this sheet is enclosed

d. ☐ Fees are to be charged to a credit card **WARNING:** Information on this form may become public **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO

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SIGNATURE

William M. Lee, Jr.

NAME

26,935

REGISTRATION NUMBER

2/19/02

DATE

537-1068

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE THE APPLICATION OF	)
	) Examiner:
Mills et al	)
	)
SERIAL NO.: To Be Assigned	)
	)
FILED: Herewith	)
	)
FOR: FABRICATION OF FABRY-PEROT POLYMER FILM SENSING INTERFEROMETERS	)

AMENDMENT ACCOMPANYING APPLICATION

Honorable Director of Patents
and Trademarks
Washington, D.C. 20231

Dear Sir:

The present application is in the national filing of international application number PCT/GB00/03238. Before calculation of the national filing fee for the United States, it is requested that the application be amended as follows:

IN THE CLAIMS:

Amend claims 5, 6, 8 & 9 as follows:

5. (Amended) A method according to claim 2, in which the deposition chamber has an internal pressure of less than 20Pa.

6. (Amended) A method according to claim 1, in which the substrate is the cleaved end of an optical fibre.

8. (Amended) A sensor according to claim 7, in which the parylene film is formed by a method according of forming an interferometer film for an interferometer sensor comprising the step of forming a polymer layer of substantially uniform thickness directly on an interferometer substrate, the layer forming the interferometer film, wherein the polymer layer is deposited by polymerisation of a gas of monomer particles including a para-xylylene.

9. (Amended) Medical analysis equipment having an interferometer sensor assembly comprising:

an interferometer sensor according to claim 7;

an interrogation source to provide an interrogation signal to the sensor; and

a detector to detect signals received from the sensor.

Remarks

The above amendments are being made in order to eliminate multiple dependency and improper multiple dependency before calculation of the national filing fee for the United States. Should any multiple dependency remain, that is unintended and the Patent and Trademark Office is requested to cancel any remaining multiple dependent claims without prejudice before calculating of the filing fee.

Appended hereto is a copy of abstract, set forth on a separate page.

The International Preliminary Examination Report reaches the conclusion that the claims meet the requirements novelty and inventive step (nonobviousness). It is submitted that the same results should occur in the United States.

Examination of the application on its merits is awaited.

Respectfully submitted,

Dated: February 19, 2002

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Version With Markings to Show Changes Made

CLAIMS

5. (Amended) A method according to [any one of claims 2 to 4] claim 2, in which the deposition chamber has an internal pressure of less than 20Pa.

6. (Amended) A method according to [any preceding] claim 1, in which the substrate is the cleaved end of an optical fibre.

8. (Amended) A sensor to claim 7, in which the parylene film is formed by a method according [to any of claims 1 to 6] of forming an interferometer film for an interferometer sensor comprising the step of forming a polymer layer of substantially uniform thickness directly on an interferometer substrate, the layer forming the interferometer film, wherein the polymer layer is deposited by polymerisation of a gas of monomer particles including a para-xylylene.

9. (Amended) Medical analysis equipment having an interferometer sensor assembly comprising:

an interferometer sensor according to claim 7 [or 8];

an interrogation source to provide an interrogation signal to the sensor; and

a detector to detect signals received from the sensor.

FABRICATION OF FABRY-PEROT POLYMER FILM SENSING INTERFEROMETERS

The present invention relates to an interferometer sensor and a method of manufacturing an interferometer sensor. In particular, the present invention relates to a method for forming a polymer film Fabry-Perot interferometer sensor.

A known interferometer comprises a polymer interferometer film, the deflection or compression of which, by a signal for analysis, modulates multiple reflections of an incident optical interrogation signal. For example, a known optical fibre interferometer using a polymer film comprises an optical fibre having a cleaved end and a polymer sensing film butted against the cleaved end. Two opposite faces of the polymer film provide the two reflecting surfaces of the interferometer. Light is introduced to the optical fibre and any external change that causes a variation in the optical thickness of the sensor film can be detected, since modulation of the thickness of the polymer film influences the output of the interferometer sensor. The external changes could include acoustic waves, quasi-static pressure and temperature variations or thermal waves caused by transient heating.

Conventionally, a disc of PET (polyethylene terepthalate) may be used as the polymer film. The disc is cut from a larger piece of the PET and adhered to the cleaved end of the optical fibre using a conventional adhesive agent. However, high uniformity in the thickness of the polymer film is required, and any irregularities in the surfaces of the PET or a any lack of uniformity in the thickness of the PET can adversely affect the operation of the interferometer. The birefringence of the PET film also has adverse effects on the sensor operation. In addition, the process of cutting out and attaching the PET film to the cleaved end of the optical fibre is complex and time consuming.

Furthermore, the applicant has recognised that the use of an adhesive agent disposed between the inner surface of the PET disc and the cleaved end of the optical fibre can

further affect the operation of the interferometer. In particular, due to its finite thickness, the adhesive agent can itself act as an additional interferometer film.

According to a first aspect of the present invention, there is provided a method of forming an interferometer film for an interferometer sensor comprising the step of forming a polymer layer of substantially uniform thickness directly on an interferometer substrate, the layer forming the interferometer film, wherein the polymer layer is deposited by polymerisation of a gas of monomer particles including a para-xylylene.

Since the interferometer film is formed directly onto the surface of the interferometer substrate, there is improved conformity between the two surfaces at the interface between the polymer layer and the substrate. Furthermore, improved uniformity in the thickness of the film can be achieved. Since no layer of adhesive is required to fix the interferometer film to the substrate, adverse interference effects from an adhesive layer are avoided.

Para-xylylene compounds are particularly effective in this application. They offer uniformity and completeness of coverage in addition to good physical, electrical, chemical, mechanical and barrier properties. Furthermore, no solvents are released during the coating process and the process is thus not affected by volatile organic compound (VOC) regulatory restrictions. In addition, the encapsulation provided by para-xylylene is excellent, being free of pin-holes in coatings as thin as 1μm.

The coating is formed by the condensation of the monomer gas, preferably under a weak vacuum, molecule by molecule. A comparatively weak vacuum (for example 10 to 20 Pa) means that the monomer gas has a mean free path of around 0.1cm, enabling the coating to form uniformly on all surfaces, in contrast to other vapour deposition methods such as thermal evaporation or sputtering in which the deposition is line-of-sight. The method of deposition of this aspect of the invention provides good uniformity of thickness, which is an essential requirement for Fabry-Perot sensing interferometers, as

they require interferometrically flat surfaces.

The use of a weak vacuum also reduces the likelihood of outgassing of the substrate or other components in deposition chamber

A wide range of thicknesses of the polymer film can be achieved, for example from 0.025 microns to 75 microns, with high thickness tolerance due to the controllable nature of the process.

Deposition preferably takes place at room temperature, avoiding damage to heat sensitive substrates such as low melting point polymers (eg poly methyl methacylate) or the optical coating on the substrate. It also avoids thermal cycling-induced stresses during deposition process which could damage the substrate or the optical coating on the substrate. Thermally-induced stresses could also lead to the film becoming birefringent which impairs sensor performance.

The method may comprise, prior to the step of polymerising, the step of forming a gas of monomer particles in a first chamber at a first pressure and a first temperature and coupling the gas of monomer particles to a deposition chamber. The substrate is placed in the deposition chamber and, at a second pressure (preferably the weak vacuum) and second temperature (preferably the ambient temperature), monomer particles polymerise on the substrate.

According to a second aspect of the present invention, there is provided an interferometer sensor comprising an interferometer substrate and a parylene polymer film of substantially uniform thickness, in which the parylene film is formed directly on the interferometer substrate.

The invention also provides medical analysis equipment having an interferometer sensor assembly comprising:

an interferometer sensor of the invention;

an interrogation source to provide an interrogation signal to the sensor; and a detector to detect signals received from the sensor.

An example of the invention will now be described in detail with reference to the accompanying drawings, in which:

Figure 1 shows an example of an interferometer including an optical fibre interferometer sensor according to the present invention; and

Figure 2 shows an apparatus suitable for performing a method according to the present invention.

Interferometers are well-known for measuring physical parameters. This invention is particularly directed to a sensor and a method of manufacturing a sensor which operates according to the principles of a Fabry-Perot interferometer. Such a device may be used to study acoustic waves or thermal waves. For the purpose of explanation only, Figure 1 shows an example of an interferometer including an optical fibre interferometer sensor according to the present invention. Although an interferometer film is shown provided at the end of an optical fibre, the interferometer film may be provided simply on a support substrate with an interferometer interrogation signal being directed through free space to the interferometer substrate.

The interferometer comprises an optical fibre 4 having a cleaved and polished end face 6. Butted against the end face 6 is a polymer film 8 having opposite parallel faces 10, 12 which are at least partially reflective to incident light from a given direction (from right to left in Figure 1). A light source and detector assembly 16 is provided to supply an optical interrogation signal 14 to the optical fibre 4. The face 12 is partially reflective so that some of the signal 14 is able to penetrate into the polymer film 8, and the face 10 may be 100% reflective. The reflectivities of the surfaces 10 and 12 may be obtained/controlled by providing a respective reflective coating to each of the surfaces 10 and 12 or by ensuring there is a refractive index mismatch between the optical fibre 4 and the polymer

film 8 and between the polymer film and surrounding medium (for example water).

In use, the optical interrogation signal 14 is supplied to the optical fibre 4 and light is reflected from the two faces 10, 12 of the polymer film 8. An incident signal 2, for example containing information about a physical parameter of a sample being analysed, modulates the optical thickness of the film 8 and hence the optical phase difference between the light reflected from the two faces 10, 12. This produces a corresponding intensity modulation of the light reflected from the film 8. As such, information about the sample can be obtained.

In conventional optical fibre polymer film interferometers, an adhesive agent is used to secure film 8 against the cleaved end 6 of the optical fibre 4. The applicant has recognised that this is undesirable since, as described above, the adhesive has a finite thickness and can act as a reflective film itself thereby introducing undesired interference to the detected optical signals. In accordance with the invention, the film is formed directly onto the interferometer substrate, for example the end of an optical fibre, to form a substantially uniform thickness layer of the polymer substance on the substrate. No adhesive is required and as such the output from the interferometer sensor is improved. Furthermore, the polymerised layer does not need to withstand removal from the substrate on which it is polymerised for subsequent attachment to another substrate. Therefore, a polymer can be selected which does not exhibit birefringence problems, and the complexity of manufacture is reduced.

Figure 2 shows an apparatus suitable for performing the method of the present invention. The apparatus of the invention forms an interferometer sensor using a parylene polymerisation process. The apparatus has an inlet chamber 18, a pyrolysis chamber 20 and a deposition chamber 22 connected by hermetically sealed tubing 24. An optical fibre 26, having an end face to be coated by the parylene, is introduced to the deposition chamber 22 via inlet valve 28. Areas of the optical fibre that are to remain free of coating are masked since the active parylene monomer will polymerise on any available

surface.

In use, a dimer parylene precursor is introduced into inlet chamber 18 via tubing where it is vaporised at approximately 150°C and in a 100Pa vacuum. The vaporised dimer continues via tubing 24 to the pyrolysis chamber 20 where it is heated to a temperature of approximately 680°C in a 50Pa vacuum.

The highly active parylene monomer gas continues via tubing 25 to the deposition chamber 22. The deposition chamber is typically at ambient room temperature and at a weak vacuum pressure, for example having an internal pressure of around 10Pa. The optical fibre 26 is placed in the deposition chamber 22 with an exposed surface onto which the parylene monomer can polymerise.

The monomer simultaneously condenses, adsorbs and polymerises on all available surfaces to produce a high molecular-weight polymer coating. Due to the chemical properties of para-xylylene and the polymerisation mechanism, the coating formed is conformal and has uniform thickness. In particular, the parylene deposition process does not entrap air since the process is carried out in an effective vacuum. The optical fibre is then removed and demasked and the coating thickness is checked.

There are three common forms of the parylene polymer, parylene C, parylene N and parylene D. Typically, the parylene coating grows at approximately 0.2μm per minute for parylene C and a slower rate for parylene N. The polymers each have high hydrophobicity and as such are particularly useful as sensors for medical probe applications.

It is important that the optical fibre being coated is clean and surface contaminants such as oils and ions are removed prior to the coating process. Conventional solvents will be used to perform the cleaning process. Prior to the coating process, a multi-molecular layer of an organo-silane may also be applied to pretreat the parts of the optical fibre that

are to be coated. This functions as an adhesion promoter, allowing the polymers to be applied to virtually any vacuum stable material.

The parylene polymerisation process described above involves simultaneous condensation, adsorption and polymerisation of the highly active monomer gas on all available surfaces of the exposed substrate.

The sensor may be used for a variety of applications. As examples, a sensor of the invention may be used for analysing ultrasonic acoustic waves, for medical imaging applications, non-destructive testing of materials, characterisation of industrial ultrasonic processes (for example ultrasonic cleaning or sterilisation processes) or analysing ultrasound source outputs. The sensor may also be used for analysing quasi-static pressure, for example for intra-arterial blood pressure measurement or for pressure measurement in hydraulic systems. The sensor may also be used for analysing quasi-static temperature, for example for temperature measurement during heating of biological tissue. Detection of thermal waves is also possible for biomedical photothermal techniques. The interferometer may also be used for chemical sensing applications, which detect the presence of certain chemicals which are absorbed into the polymer layer, thereby changing the optical thickness. The possible uses of a Fabry-Perot interferometer will be apparent to those skilled in the art.

The Parylene deposition process is described in further detail in the article "Conformal Coating Using Parylene Polymers" in the January/February 1997 issue of Medical Device Technology, publication number 0183, which is incorporated herein by way of reference material.

CLAIMS

1. A method of forming an interferometer film for an interferometer sensor comprising the step of forming a polymer layer of substantially uniform thickness directly on an interferometer substrate, the layer forming the interferometer film, wherein the polymer layer is deposited by polymerisation of a gas of monomer particles including a para-xylylene.

2. A method according to claim 1, further comprising, prior to the polymerisation, the step of forming a gas of monomer particles in a first chamber at a first pressure and a first temperature and coupling the gas of monomer particles to a deposition chamber.

3. A method according to claim 2, wherein the substrate is placed in the deposition chamber and, at a second pressure and second temperature, monomer particles polymerise on the substrate.

4. A method according to claim 3, wherein the second temperature is the ambient temperature.

5. A method according to any one of claims 2 to 4, in which the deposition chamber has an internal pressure of less than 20Pa.

6. A method according to any preceding claim, in which the substrate is the cleaved end of an optical fibre.

7. An interferometer sensor comprising an interferometer substrate and a parylene polymer film of substantially uniform thickness, in which the parylene film is formed directly on the interferometer substrate.

8. A sensor according to claim 7, in which the parylene film is formed by a method

according to any of claims 1 to 6.

9. Medical analysis equipment having an interferometer sensor assembly comprising:

an interferometer sensor according to claim 7 or 8;

an interrogation source to provide an interrogation signal to the sensor; and

a detector to detect signals received from the sensor.

ABSTRACT

FABRICATION OF FABRY-PEROT POLYMER FILM SENSING INTERFEROMETERS

A method of forming an interferometer film for an interferometer sensor comprises forming a parylene polymer layer (8) of substantially uniform thickness directly on an interferometer substrate (4;45), the layer forming the interferometer film. Since the interferometer film (8) is formed directly onto the surface of the interferometer substrate, there is improved conformity between the two surfaces at the interface between the polymer layer and the substrate and improved uniformity in the thickness of the film.

[Figure 1]

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(19) World Intellectual Property Organization
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(71) Applicant *(for all designated States except US)*: **UNIVERSITY COLLEGE LONDON** [GB/GB]; Gower Street, London WC1E 6BT (GB).

(72) Inventors; and
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(74) Agent: **ELKINGTON AND FIFE**; Prospect House, 8 Pembroke Road, Sevenoaks, Kent TN13 1XR (GB).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

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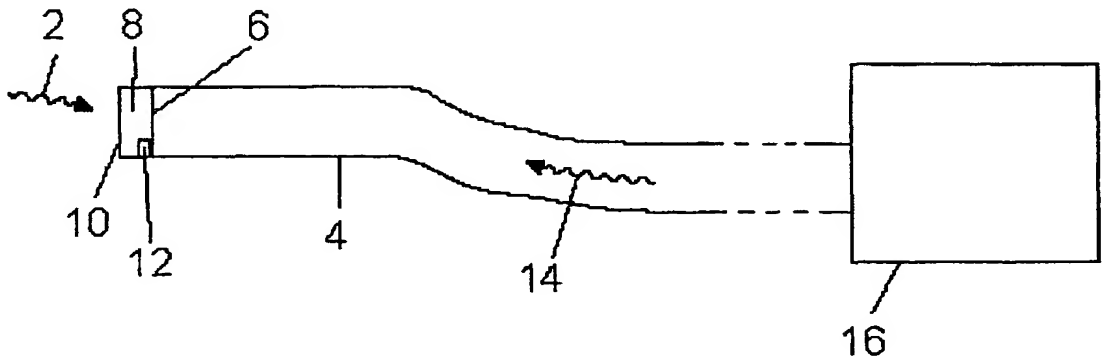
Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FABRICATION OF FABRY-PEROT POLYMER FILM SENSING INTERFEROMETERS



(57) Abstract: A method of forming an interferometer film for an interferometer sensor comprises forming a parylene polymer layer (8) of substantially uniform thickness directly on an interferometer substrate (4;45), the layer forming the interferometer film. Since the interferometer film (8) is formed directly onto the surface of the interferometer substrate, there is improved conformity between the two surfaces at the interface between the polymer layer and the substrate and improved uniformity in the thickness of the film.

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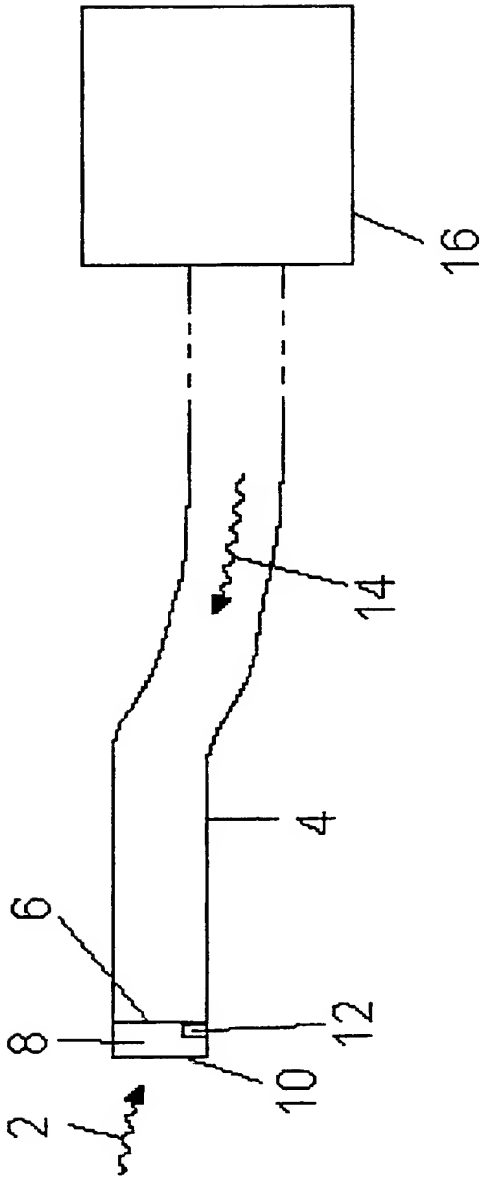

Fig. 1

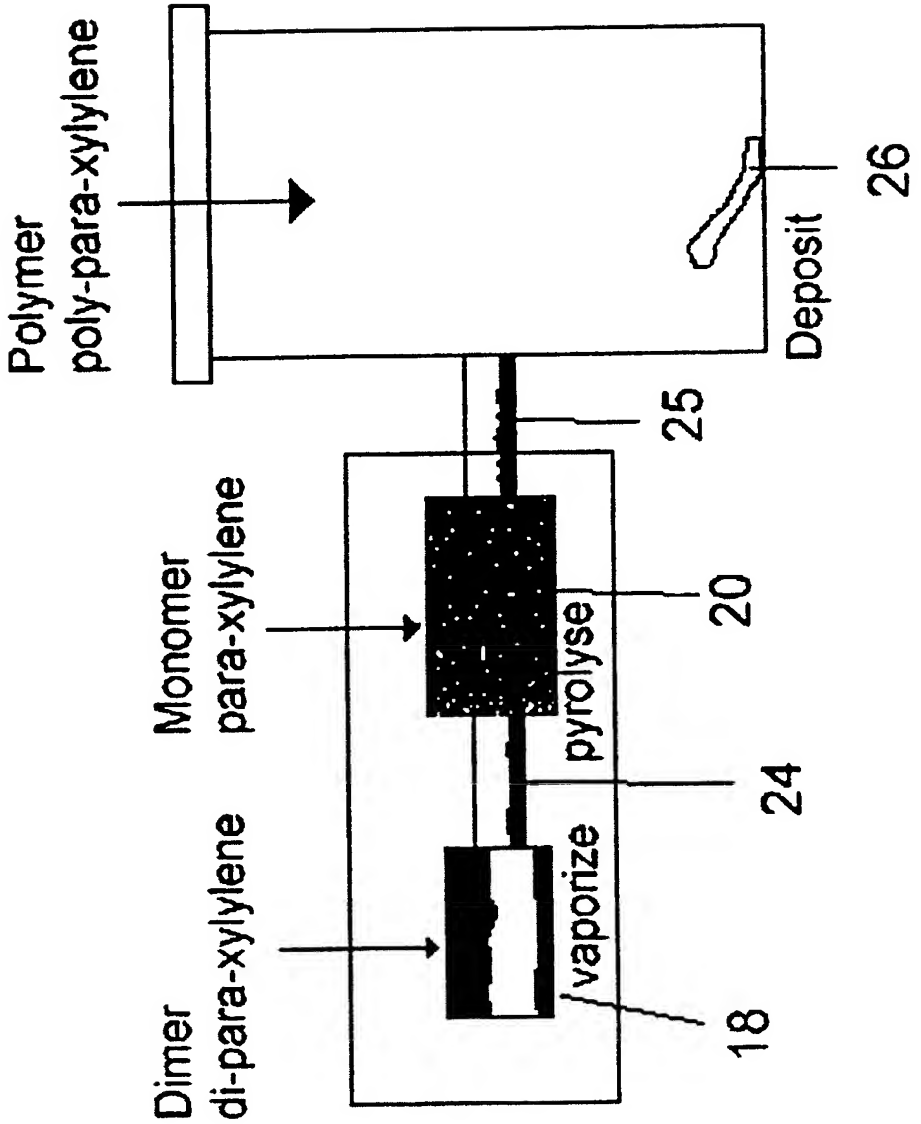
Polymer
poly-para-xylylene
Deposit
26
25
Monomer
para-xylylene
pyrolyse
20
24
Dimer
di-para-xylylene
vaporize
18

Fig. 2

Attorney Docket No. 537-1068

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled Fabrication of Fabry-Perot Polymer Film Sensing Interferometers, the specification of which:

__ is attached hereto.

x was filed on 18 August 2000 as

Application Serial No. PCT/GB00/03238 and

was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

PRIOR FOREIGN APPLICATION(S)

Country	Number	Date Filed	Priority Claimed Yes	No
Great Britain	9919688.3	19 AUGUST 2000	X	

I hereby claim the benefit under Title 35, United States Code Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

Application Serial No.	Filing Date	Status
PCT/GB00/03238	18 AUGUST 2000	Pending

And I hereby appoint William M. Lee, Jr., Registration No. 26,935, Thomas E. Smith, Registration No. ~~18,243, Den~~nis M. McWilliams, Registration No. 25,195, James R. Sweeney, Registration No. ~~18,721,~~ Glenn W. Ohlson, Registration No. ~~28,455, D~~avid C. Brezina, Registration No. 34,128, Jeffrey R. Gray, Registration No. 33,391, Gerald S. Geren, Registration No. 24,528, ~~T~~imothy J. Engling, Registration No. ~~39,970, P~~eter J. Shakula, Registration No. 40,808, Robert F. I. Conte, Registration No. 20,354, Howard B. Rockman, Registration No. 22,190, John W. Hayes, Registration No. 19,286, and Mark A. Hagedorn, Registration No. 44,731, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith. It is requested that all communications be directed to Lee, Mann,

Smith, McWilliams, Sweeney & Ohlson, P.O. Box 2786, Chicago, Illinois 60690-2786, telephone number (312) 368-1300.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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